RHYNCHOSPORA ZACUALTIPANENSIS AND *ELEOCHARIS MOOREI*, TWO NEW CYPERACEAE FROM MEXICO

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ABSTRACT

Rhynchospora zacualtipanensis M. Strong and *Eleocharis moorei* M. Strong & S. González, from eastern Mexico, are described and illustrated. Their relationships to closely allied and morphologically similar species are discussed.

RESUMEN

Se describen e ilustran *Rhynchospora zacualtipanensis* M. Strong y *Eleocharis moorei* M. Strong & S. González, del oriente de México, y se discuten sus relaciones con especies cercanas y morfológicamente similares.

Rhynchospora Vahl nom. cons. is a genus of approximately 250 species worldwide. It is most diverse in the Western Hemisphere, particularly warm-temperate North America and the neotropics. Espejo Serna and López Ferrari (1997), recognized 51 taxa (including infraspecific taxa) from Mexico.

Rhynchospora, a very vegetatively diverse group, contains plants that range from small diminutive annuals less than 10 cm tall to large rhizomatous perennials up to 3 m tall. The leaves are primarily basal, 2-several cauline, linear to filiform, dorsiventrally compressed, and often have scabrous margins. The inflorescence ranges from a single solitary spikelet or capitate head of spikelets at the summit of the culm to large decompound panicles of many spikelets, often composed of a terminal and a series of 1-several lateral, remote or contiguous, simple to compound, corymbiform or cymose partial panicles from the upper sheathing bracts. The floral morphology is generally uniform and can be characterized as follows: spikelets have spirally arranged scales, with (1–)2-many basal scales empty (sterile), the fertile scales are borne above these and each subtends a perfect flower, or often the terminal 1–2 scales are staminate only with an abortive pistil; each flower has (1–)2–3 stamens; the style is 2-branched or entire; and achenes are biconvex or lenticular and are often transversely rugose or rugulose, each bearing at its apex the persistent triangular, triangular-lanceolate or discoid base of the style.

Rhynchospora zacualtipanensis M. Strong, sp. nov. **(Fig. 1)**. TYPE: MÉXICO. HIDALGO STATE: Zacualtipán District, ca. 3 mi [4.8 km] from Zacualtipán on road to Tianguistengo, 2100 m, pine woods and sphagnum bogs, in sphagnum, 4 Jul 1947, *Moore 3327* (HOLOTYPE: BH; ISOTYPES: MICH, UC, US 3386987). Possible isotypes at G and M [These herbarium acronyms were also recorded in

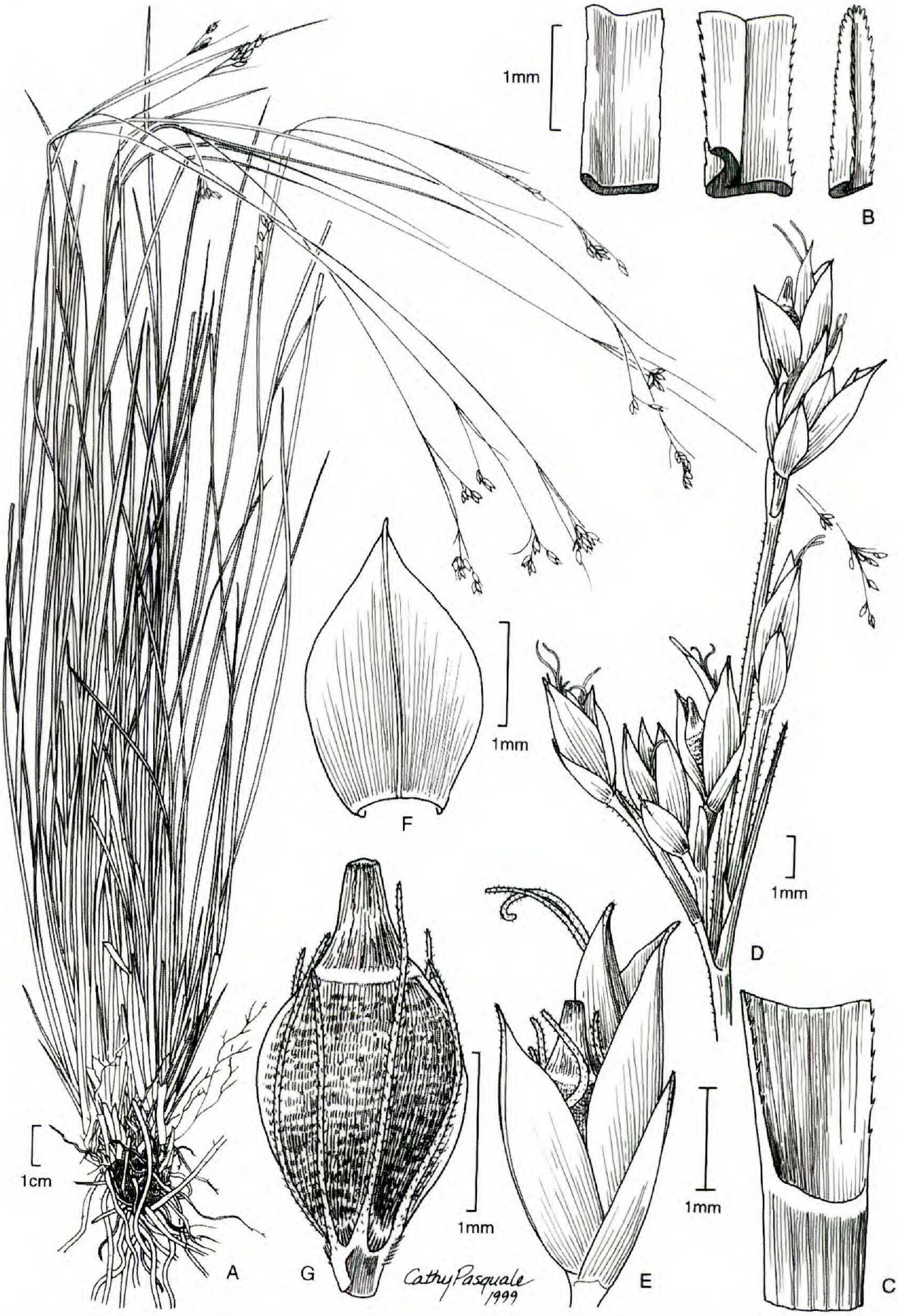

FIG. 1. *Rhynchospora zacualtipanensis* M. Strong (drawn from the type). A. Habit. B. Sections of leaf blades, proximal end (left) to apex (right). C. Section of leaf at sheath orifice showing junction of sheath and blade. D. Detail of terminal inflorescence panicle. E. Mature spikelet with achene. F. Spikelet scale. G. Achene.

H.E. Moore's collection notebook as prospective herbaria for the distribution of duplicates. However, recent searches made by curators at these institutions were unsuccessful].

Planta perennis caespitosa glabra rhizomate brevi crasso. Culmi erecti vel ascendentes, 20–60 cm alti, 0.5–1.7(–2) mm lati, obtuse trigoni vel subteretes. Folia basilaria et inferne caulinaria; vaginae eligulatae; laminae 10–30 cm longae, 0.5–2 mm latae vel 3 mm latae ubi planae, v-formae vel subcomplicatae vel subinvolutae vel lunulatae apicem versus subtrigonae. Inflorescentia paniculata, paucispiculata, panicula terminalis major, superiores 2 approximatae, laterales 1–2, pedunculatae, pedunculi ad 6 cm longi. Spiculae 3.5–4.2 mm longae, 1.2–1.5(–1.6) mm latae, anguste ovoideae vel ovoideo-lanceoloideae, 3-4-floriferae, 2 nucigerae; squamae 5–7, ovatae vel ovato-ellipticae, mucronatae vel breviter aristatae, divergentes ubi maturae, squamae fertiles (2.5–)2.6–3.1 mm longae, 2–2.7(–3) mm latae, squamae steriles breviores. Stamina tres, antheris 1.5–3 mm longis. Stylus profunde bifidus. Achaenia 1.8-2.1 mm longa (sine styli basi), 1.2–1.4 mm lata, obovata biconvexa spadicea, leviter transverse rugulosa; styli basis anguste triangularis, 0.8–1 mm longa, 0.3–0.7 mm lata; setae 6, antrorse barbatae, basi saepe setosae, achaenium leviter breviores ad superantes.

Caespitose perennial; rhizome short, thickened and knotty. Culms erect or ascending, 20–60 cm tall, 0.5–1.7(–2) mm wide, obtusely trigonous to subterete, finely ribbed, often channelled along one side distally, green, glabrous. Leaves basal and lower cauline; sheaths eligulate, coarsely veined abaxially, green to pale brown, often reddish brown proximally, glabrous, the inner band membranous, finely veined, reddish brown, with concave orifice at apex; blades somewhat stiff, 10–30 cm long, 0.5–2 mm wide (to 3 mm wide when flattened) widely to narrowly v-shaped or crescentiform in cross section, sometimes subinvolute or tightly folded, often subtrigonous towards apex, finely ribbed abaxially, smooth adaxially, at least medially, green, glabrous, the margins antrorsely scabrous or sometimes essentially smooth proximally. Inflorescence composed of a terminal and 1–2, small, lateral cymose-fasciculate partial panicles, the lateral panicles on slender peduncles to 6 cm long, the lowest panicle remote from the two upper subcontiguous ones; peduncles flattened, finely ribbed, antrorsely scabrous on margins, glabrous; bracts of the panicle branches setaceous, those subtending the peduncles, particularly the lower, leaf-like; spikelet pedicels subtrigonous or plano-convex in cross section, the margins often antrorsely scabrous; spikelets narrowly ovoid to ovoid-lanceoloid, 3.5–4.2 mm long, 1.2–1.5(–1.6) mm wide, with 5–7 scales, 3(–4)-flowered, maturing 2 achenes, the scales spreading with maturing achenes; scales ovate to ovate-elliptic, indistinctly finely veined, glabrous, margins entire, the midcosta prominent, pale brown to brown, prolonged beyond the acute to acuminate apex as a mucro or short awn; fertile scales (2.5–)2.6–3.1 mm long, 2–2.7(–3) mm wide; sterile scales 2–3 at base of spikelet, smaller than fertile ones, 2–2.2(–2.5) mm long, 0.8–1.2 mm wide. Flowers bisexual; stamens 3, the anthers 1.5–3 mm long, basifixed, thecae parallel, longitudinally dehiscent, apiculate at apex; style 2-branched from below middle, ca. 2/3 length of style, the branches glabrous, minutely scaly; achenes biconvex, obovate or obpyriform, achene body 1.8–2.1 mm long (excluding style base), 1.2–1.4 mm wide, light brown to yellowish brown, finely transversely rugulose; style base narrowly triangular, 0.8–1 mm long, 0.3–0.7 mm wide, pale brown, often truncated at apex; bristles 6, antrorsely barbed, reddish brown, often setose at very base, slightly shorter than to equaling or exceeding the length of the achene body with several sometimes equaling the tip of the style base.

Habitat and distribution.—Rhynchospora zacualtipanensis is known only from the type collection made in the southern extent of the Sierra Madre Oriental mountain range at approximately 20° 43' 00"N, 98° 39' 00"W, ca. 4.8 km north of the town of Zacualtipán. It occurs in pine woods and sphagnum bogs at about 2100 m.

Rhynchospora zacualtipanensis is a species of *R.* subgenus *Rhynchospora*. It keys to *R.* section *Stenophyllae* Kükenthal in Kükenthal's (1950) monumental worldwide treatment of the subfamily Rhynchosporideae. Section *Stenophyllae* included Gale's (1944) *Rhynchospora* section *Rhynchospora* series *Glaucae* (C.B. Clarke) Gale (in part), and series *Rariflorae* Gale (in part). *Rhynchospora zacualtipanensis* seems to be best placed in *R.* section *Glaucae* C. B. Clarke as circumscribed by Guaglianone (1979). The obovate or obpyriform, yellow-brown achene, with a longitudinally striate surface interrupted by transverse corrugations (finely transversely rugulose) is characteristic of species in that section. However, the narrow (0.5–2 mm), stiff, thickened, often v-shaped or crescentiform leaf blades of *R. zacualtipanensis* are uncharacteristic of the wider (1–5 mm), flattened leaf blades typical of species in *R.* section *Glaucae*. *R. zacualtipanensis* can be distinguished at once by this feature from closely related species such as *R. brownii* ssp. *americana* Guaglianone, *R. pungens* Liebmann, and *R. rugosa* (Vahl) Gale. Generally, *R. zacualtipanensis* has longer bristles and a longer style base than *R. brownii* and *R. pungens*. The bristles of *R. zacualtipanensis* typically equal or exceed the length of the achene body with several sometimes equaling the tip of the style base, while in the latter two species, there are generally several that are shorter than the achene body and rarely do any equal the tip of the style base. The style base of *R. zacualtipanensis* ranges from 0.8–1 mm in length while those of *R. brownii* ssp. *americana*, *R. pungens*, and *R. rugosa* range from 0.5–0.8 mm in length. In a treatment of Mesoamerican *Rhynchospora* by Thomas (1992), *R. zacualtipanensis* falls out at couplet 79[b] (*R. rugosa*) in the part of the key that treats species of *R.* section *Glaucae*. *R. zacualtipanensis* can be distinguished from the wide-ranging *R. rugosa* by the morphology of the leaf blades (as previously discussed) and further distinguished by its shorter spikelets (3.5–4.2 mm vs. 3.5–5 mm long) and smooth margins of the style base (often antrorsely scabrous proximally in *R. rugosa*).

Eleocharis R. Brown is a widely distributed genus of ca. 200 species with 43 species recorded by Espejo Serna & López Ferrari (1997) from Mexico. The taxonomy of the genus is difficult, in part because there are very few morphological characters represented, e.g., the inflorescence is reduced to a single spikelet and lacks foliar involucral bracts; and leaves are all basal and reduced to tubular sheaths (González & Peterson 1997).

Eleocharis moorei M. Strong and S. González, sp. nov. (**Fig. 2**). TYPE: MÉXICO. HIDALGO STATE: District Zacualtipán, ca. 3 mi [4.8 km] from Zacualtipán on road to Tianguistengo, 2100 m, pine woods and sphagnum bogs, in sphagnum, 4 Jul 1947, *H.E. Moore, Jr. 3332* (HOLOTYPE: BH; ISOTYPES: MICH, UC, US 2594748). Possible isotypes at B, G, and M [These herbarium acronyms were also recorded in H.E. Moore's collection notebook as prospective herbaria for the dis-

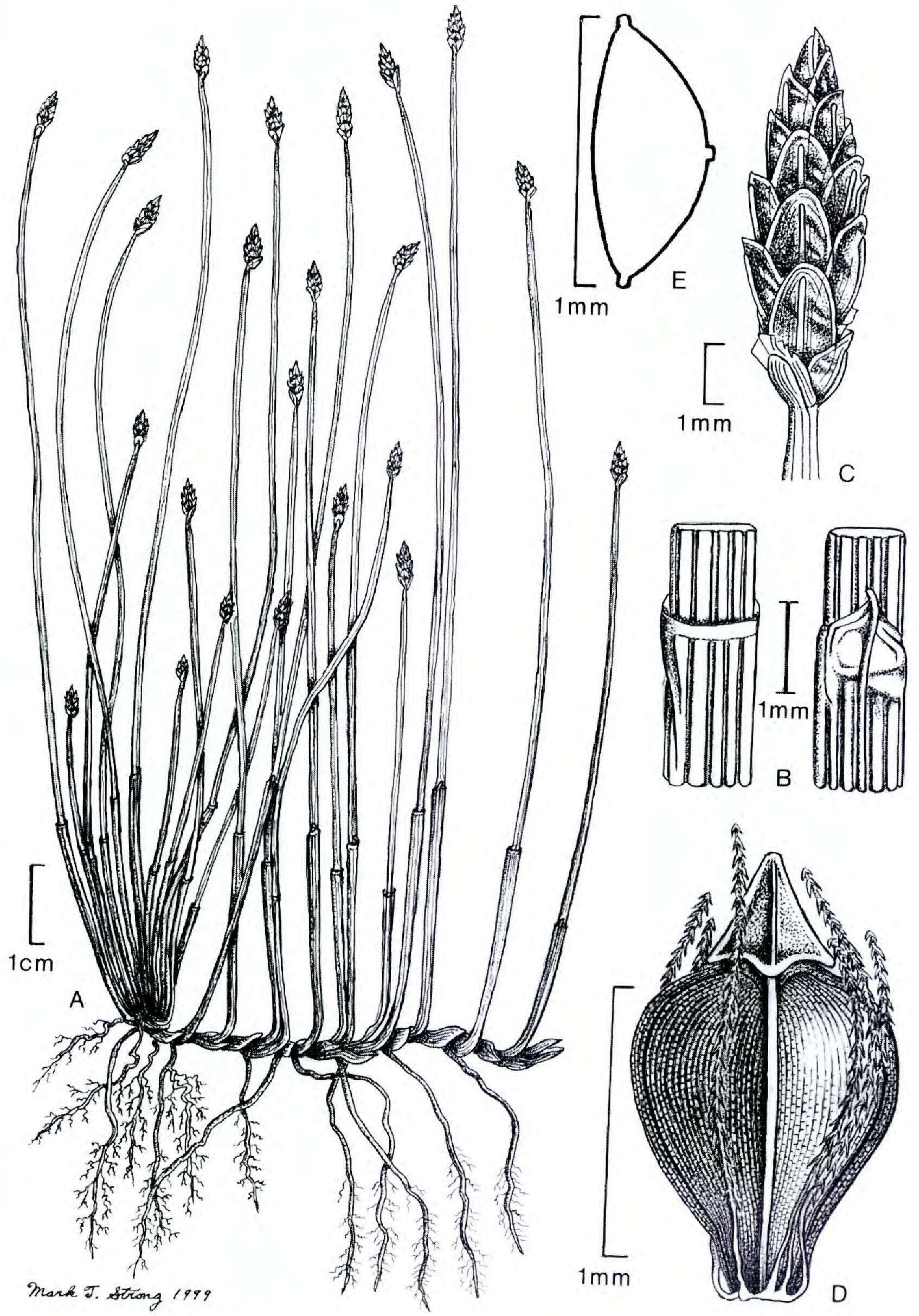

Fig. 2. *Eleocharis moorei* M. Strong & S. González (drawn from the type). A. Habit. B. Sections of culm showing dorsal summit of leaf sheath with acute, mucronate apex (right) and ventral summit of leaf sheath with slightly concave membranous orifice (left). C. Inflorescence (single spikelet). D. Achene. E. Cross section outline of achene at its widest point.

tribution of duplicates. However, recent searches made by curators at these institutions were unsuccessful].

Planta perennis. Rhizoma ca. (1.5–)2.5–3.5 mm crassum, repens vel oblique ascendens cum squamis atropurpureis instructum. Culmi erecti, 4-20 cm alti, (0.2–)0.4–1 mm latae; apice vaginis subtruncatis vel subobliquis vel subacutis. Spiculae 3.5–9 mm longae, 2.5–3 mm latae, ovatae vel lanceolatae, plerumque acutae, 9–35-floriferae; squamae floriferae polystichae, 2–2.6 mm longae, carinatae, ovatae vel oblongae, obtusae, maturitate divergentibus ad apicem. Stamina tres, antheris (0.6–)1.1 mm longis. Stylus trifidus. Achaenia 1.4–1.6 mm longa (cum styli basi), 0.75–1 mm lata, late obovata vel obpyriformia, obtuse trigona vel biconvexa ad superficiem abaxialem cristata, angulis costatis, lutea vel rubro-brunnea, conspicue reticulata; styli basis pyramidalis vel deltata, leviter complanata, basaliter crassa trilobata leviter decurrens; setae 4–7, retrorsum barbatae, achaenium aequantes vel superantes.

Perennial from an elongated, creeping or slightly ascending rootstock ca. (1.5–)2.5–3.5 mm thick, covered by conspicuous, elongate, sheath-like, dark purple, fibrous scales. Culms caespitose, or sometimes solitary along the rhizome, erect, 4–20 cm tall, (0.2–)0.4–1 mm wide, angular to terete, soft, flattened when dried, finely sulcate, pale green; sheaths membranous, purple, or stramineous and purple-striolated at the base, green to translucent distally, subtruncate to slightly oblique or acute at apex dorsally, emucronate or with a 0.1–0.2 mm long mucro, the orifice margin not or slightly darkened; upper sheaths with the ventral orifice concave; lower sheaths with the ventral orifice truncate to somewhat convex. Spikelets ovoid to ovoid-lanceoloid, 3.5–9 mm long, 2.5–3 mm wide, usually acute to subacuminate at apex; rachilla 0.3–0.4 mm wide, 9–35-flowered; scales polystichous, 2–2.6 mm long, 0.5–0.8 mm wide in lateral view, divergent distally, membranaceous, subtranslucent, ovate to oblong, obtuse at apex, carinate, with a narrow pale green to stramineous midvein, the sides dark purple to black distally, the margins and apex very narrowly hyaline, (at most 0.1–0.2 mm wide); 1–2 basal scales shorter, 1–2.3 mm long, 1–1.8 mm wide, ovate, obtuse, ecarinate, with a broad midvein of the same color and appearance as the culm, the sides purple, black, or hyaline, and the margins and apex hyaline, 0.3–0.5 mm wide; flowers bisexual; stamens 3, the anthers (0.6–)1.1 mm long, the connective shortly prolongated at apex; style 3-branched. Achene 1.4–1.6 mm long (including the style-base), 0.75–1 mm wide, very obtusely triangular or biconvex with a costula on the abaxial face, the angles costulate, widely obovate to obpyriform, yellow to reddish-brown, finely and shallowly cellular-reticulate, often conspicuously so, the cells rectangular or nearly square, longitudinally arranged; style base pyramidal to deltoid, dorsally subflattened, 0.4–0.5 mm long and as wide at base, sometimes slightly wider than the apex of the achene, trilobate at the base, the lobes slightly decurrent on the angles of the achene, whitish to brown, sometimes with a narrow ridge at junction with the body of the achene; bristles 4–7, reddish brown or yellowish, retrorsely barbed 1/2 to 2/3 their length, equaling to exceeding the achene.

PARATYPE. MEXICO. VERACRUZ STATE: carretera al sur de Huayacocotla, 17 km del borde con Hidalgo, 2100 m, Bosque de encino, suelo arcilloso, hierba 5 cm, perenne, regular, 13 Jul 1977, *J. Fay and J.I. Calzada 883* (F, US 2879357) [distributed as *Eleocharis acicularis* (L.) R. Br.].

Habitat and distribution.—*Eleocharis moorei* is known from only two localities that are in close proximity to each other in the southern extent of the Sierra Madre Oriental mountain range in the states of Hidalgo and Veracruz. These lie at approximately 20° 33' 00"N, 98° 29' 00"W to 20° 43' 00"N, 98° 39' 00"W, the Hidalgo locality near Zacualtipán being approximately 25–30 km northwest of the Veracruz locality near Huayacocotla. *E. moorei* occurs in sphagnum bogs in pine woods, and in oak forest, at about 2100 m.

The name of the new species honors its collector, Harold Emery Moore, Jr. (1917–1980), world renowned Arecaceae specialist, professor, and director of the L.H. Bailey Hortorium at Cornell University, Ithaca, New York from 1960–1980.

Eleocharis moorei belongs to *E.* series *Eleocharis* (*E.* series *Palustriformes* of Svenson 1929, 1932, 1939, 1957), subseries *Truncatae* Svenson, in the subgenus *Eleocharis*. However, its achene with costulate angles and trilobate style base distinguishes it from all other species in the group. Achenes of *E. tricostata* Torrey are prominently costulate, but in cross section they are trigonous, while those of *E. moorei* are very obtusely triangular or biconvex with a costula on the abaxial face. The achenes of *E. tricostata* also differ in bearing a much shorter and narrower style base that is neither trilobate nor decurrent, and they lack bristles. Furthermore, the sheaths and scales of *E. tricostata* differ as well in being lighter-colored, and the spikelets are generally longer and obtuse to subrounded at apex while those of *E. moorei* are acute to subacuminate. *E. moorei* differs from *E. compressa* Sullivan in having scale tips not whitened and attenuate; larger achenes with a different tubercle; and more abundant bristles, which are longer and coarser. From *E. montevidensis* Kunth it differs in the elongate, sheath-like, dark purple and fibrous scales covering the rhizome; the soft, flattened culms; the membranous sheaths; the spikelets usually acute; the larger, biconvex or very obtusely triangular achene with costulate angles; and the big tubercle which is trilobate at the base. From the variable *E. tenuis* (Willdenow) Schultes, *E. moorei* differs in the coarser, flattened culms; the lowest spikelet scale being shorter than the middle scales; the larger, biconvex to obtusely trigonous achenes with much less pronounced reticulation; and the larger and coarser bristles.

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